

**TRANSCONDUCTANCE AND CURRENT MODULATION
FOR RESONANT FREQUENCY CONTROL AND SELECTION**

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Abstract of the Disclosure

In various embodiments, the invention provides a frequency controller and a temperature compensator for frequency control and selection in a clock generator and/or a timing and frequency reference. The various apparatus embodiments include a resonator adapted to provide a first signal having a resonant frequency; an amplifier; a
10 temperature compensator adapted to modify the resonant frequency in response to temperature; and a process variation compensator adapted to modify the resonant frequency in response to fabrication process variation. In addition, the various embodiments may also include a frequency divider adapted to divide the first signal
15 having the resonant frequency into a plurality of second signals having a corresponding plurality of frequencies substantially equal to or lower than the resonant frequency; and a frequency selector adapted to provide an output signal from the plurality of second signals. The output signal may be provided in any of various forms, such as differential or single-ended, and substantially square-wave or sinusoidal.

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